

Play, MAKE, and Learn!

Computer & Information Principles: 1000 Level College Course

Standards:

Web Literacy 2.0 skills addressed (Mozilla Learning, 2015):

- **Read:** Search, Navigate, Synthesize, Evaluate (Problem-solving, Creativity)
- **Participate:** Connect, Open Practice, Share (Problem-solving, Communication, Creativity, Collaboration)
- **Write:** Design, Code, Compose, Revise, Remix (Problem-solving, Communication, Creativity)

21st Century Skills (21C Skills) addressed (Mozilla Learning, 2015):

- Problem-Solving
- Communication
- Creativity
- Collaboration

Objectives:

Upon completion of this lesson, students will acquire the following information and gain the following skill sets aligned with Web Literacy 2.0 and 21C Skills:

- Students will create a prototype computer interface using Makey Makey.
 - Web literacy 2.0: Write, Participate
 - 21C Skills: Problem-solving, Communication, Creativity, Collaboration
- Students will be exposed to and work with basic programming techniques using Scratch as a learning tool.
 - Web literacy 2.0: Read, Write, Participate
 - 21C Skills: Problem-solving, Communication, Creativity, Collaboration
- Students will learn about remixing as it pertains to Scratch.
 - Web literacy 2.0: Write, Participate
 - 21C Skills: Problem-solving, Communication, Creativity, Collaboration
- Students will experience sharing for learning and collaboration purposes within the Scratch community.
 - Web literacy 2.0: Read, Write, Participate
 - 21C Skills: Problem-solving, Communication, Creativity, Collaboration
- Students will gain experience using Google Docs/Drive for documenting and sharing their work.
 - Web literacy 2.0: Read, Participate
 - 21C Skills: Communication, Collaboration
- Students will experience working in a team environment in order to achieve a common outcome.
 - Web literacy 2.0: Read, Write, Participate
 - 21C Skills: Problem-solving, Communication, Creativity, Collaboration

Key Questions:

1. Is a personalized learning environment being created based on each group's interests as the groups work through each section of the lesson? If not, why not? What could be done to make the shift to personalized learning?
2. Is the Maker culture being observed as students create their Makey Makey prototype?
3. Is learning being enhanced through the use of technology?
4. Is learning being enhanced through the use of multimodal elements within the lesson?
5. Is the connection between programming techniques and a computer interface being made?
6. Is the technique and purpose of remixing understood?

Overview, Purpose and Rationale:

The purpose of this lesson is to introduce students to using the Makey Makey invention kit as a computer interface in conjunction with an online programming tool called Scratch, to make the connection between computers and programming. This lesson will allow students to play, create, explore, and learn collaboratively and then share their work via the Scratch community and as a Google Doc.

Students will work actively and collaboratively in groups of 5-6 to build a prototype using the Makey Makey invention kit. The prototype will include the use of everyday objects that act as controller keys connected to the Makey Makey board. Students will be given the URL to an existing project in Scratch created by the instructor for testing purposes to ensure that their Makey Makey board and controllers function correctly.

Students will work actively and collaboratively in groups of 5-6 to remix and modify an existing project using Scratch. Students will search and locate an existing project in Scratch then remix the project to produce their own modified version of the project. Upon completion, the group will share their project within the Scratch Community, create a Google Doc based on their group discussions, and share their document with each group member and myself.

Upon completion, the Makey Makey prototype should use everyday objects to act as a computer interface and successfully interact with the Scratch project that was created. Each group has the freedom to explore and choose the objects being used as controllers and how they wish to remix their Scratch project in order to promote a personalized learning environment.

The overall intent of this lesson is to create a personalized learning environment that exposes students to basic programming techniques and to interact with technology by creating a computer interface using Makey Makey in order to make the connection between programming and a computer interface. The lesson will indirectly teach students to "reimagine learning" (Culatta, 2013) through the use of technology. Culatta suggests that shifting to a **personalized learning** approach is essential for the future of education and this approach leverages the use of technology to do so. The personalized learning environment provokes learner engagement because the learner creates an environment specific to his or her individual needs. "In order to develop a learning environment, individual differences need to be taken into consideration to ensure the impact on students' achievements and satisfactions." (Samah, Noraffandy, & Ali, 2011).

Students will experience the Maker culture where they are encouraged to create, play, imagine, and explore different outcomes based on their interests and in turn create their own personalized learning environment. The learner-centered approach will use technology to create a more dynamic and engaging learning experience.

This lesson will include a multimodal environment where video, imagery, hands-on activities, and written instruction are used to enhance learning. The Web Literacy framework and 21st century skills will be addressed within this lesson.

Duration: 1.5 Hours (Adjustments to duration may need to be modified based on group dynamics and experience levels)

This course meets twice a week and is a total of 2 hours in length per session. This lesson will be spread across 2 class sessions with this lesson being incorporated into only a portion of each session.

1. **Introduction:**
 - a. Session 1: 5 – 7.5 minutes (Makey Makey instructions)
 - b. Session 2: 5 – 7.5 minutes (Scratch instructions)
2. **Making:**
 - a. Session 1 (30 minutes - Makey Makey)
 - b. Session 2 (30 minutes - Scratch)
3. **Assessment:**
 - a. Session 1 (5 minutes – Makey Makey)
 - i. Individual group discussion, create, upload, and share Google Doc
 - b. Session 2 (5 minutes - Scratch)
 - i. Individual group discussion, update Google Doc
4. **Wrap up:**
 - a. Session 2: 10 minutes (Class discussion with all groups)

Before this Lesson:

- Students will be assigned to read Chapter 4 within the *Technology in Action* course textbook which focuses on "Application Software: Programs That Let You Work and Play".
- Students will be required to watch the videos listed below in preparation for using Makey Makey, Scratch, and Google Docs/Google Drive.
- Students will select their group members and group name.
- Students will be asked to bring in a minimum of 2 everyday objects to class to use with the Makey Makey kit.
- The instructor will briefly demonstrate and discuss the Makey Makey kit, Scratch, and Google Docs/Drive.

NOTE: (The URLs listed below have been shortened via Bitly)

Makey Makey Videos

- Makey Makey: An Invention Kit for Everyone: <http://bit.ly/1WepEP8>
- Jay Silver: Hack a banana, make a keyboard!: <http://bit.ly/1XiQrs6>
- Makey Makey - Practical and Fun Computer Control: <http://bit.ly/1NajgRM>
- MaKey MaKey - How would YOU interact with your computer?: <http://bit.ly/1VzpMbt>

Scratch Videos

- Scratch Overview: <http://bit.ly/1UYugKo>
- Intro to Scratch: <http://bit.ly/25MIMYT>

Google Drive Video

- Google Drive: Sharing your documents and files: <http://bit.ly/1TDx8dX>

Materials Needed:

- Internet access (26 students – classroom limit)
- Makey Makey Classic Invention Kit (5 kits, 5-6 students per group, \$49.95 each)
- Classroom computer access (personal laptops may be used) (10 total, 2 per group)
- Current version of either Google Chrome or Firefox web browsers.
- Google account - Free (1 per group)
- Scratch account - Free (1 per group)
- Everyday objects to use with Makey Makey (supplied by students)
- Access to a cell phone with a camera (supplied by students, optional)

Information:

Give and/or demonstration necessary information

- Demonstration/Instruction of creating a prototype using Makey Makey as a computer interface.
- Demonstration/Instruction of using Scratch and how Makey Makey interfaces with Scratch.
- Demonstration/Instructions of creating a Google Doc and how it can be shared.
- Demonstration of Google Drive.

Lesson: Class Session 1 Breakdown

NOTE: A self-assessment will be completed following the conclusion of the entire lesson.

1. I will introduce Makey Makey with a brief demonstration of the kit and its content.
2. Following the demonstration, students will assemble within their groups that were chosen in the previous class session. Students are instructed to have their 1-2 everyday objects that they brought from home handy to use with the Makey Makey kit.
3. I will hand out a Makey Makey kit to each group and go over some basic instructions.
4. Each group will be encouraged to visit the Makey Makey website and review the Makey Makey videos for guidance (if needed). I am expecting some groups to begin playing immediately and others to review the videos before "playing". This will largely depend on the group dynamics, confidence, and experience levels.
5. I will direct the students to an existing project that I created in Scratch to test the Makey Makey functionality with their everyday objects. The URL will be displayed on the large screen within the classroom along with the Scratch project that I created. The Makey Makey interface and Scratch project that I created will be set up within the classroom so the students can interact with it if needed. The students were expected to review the Makey Makey, Scratch, and Google video(s) prior to the class session so they have an understanding of each component of the lesson.
6. Students are encouraged to play, explore, and create their computer interface using Makey Makey. I will encourage creativity, collaboration, and exploration as they work with their kit.
 - a. I will recommend that a selected group member take pictures of the Makey Makey prototype as it's "played" with by the group. I don't want to make this a requirement in the

event that a group does not have access to a cell phone with a camera, so it's only being "recommended". I will have students sign a release form from the college if any images of students are used for documentation.

7. I will be circulating throughout the classroom as groups work on their prototype to observe the exploration, communication, interaction, collaboration, and creativity taking place within the groups.
8. After the making session has ended, I will instruct the students to choose one group member to serve as the point of contact and owner of the Google Doc for the group. I will stress that this person is the point person for the group but every group member should contribute to the process and discussion. The point person should have an existing Google account and if not, he/she will need to create one.
9. After the point person is selected, the group will discuss their experience(s) using Makey Makey, what they learned, any successes and/or failures, and the types of objects they used as controllers. The point person will create a Google Doc, document the discussion, and then share the document with each group member as well as myself.
10. Each group's Makey Makey kit will be labeled with their group name and stored within a cabinet within the classroom. This will allow students to jump right into creating their Scratch project next class session.

Lesson: Class Session 2 Breakdown

NOTE: A self-assessment will be completed following the conclusion of the entire lesson.

1. I will introduce Scratch with a brief demonstration of the different areas on the website and its components. I will show the Explore section of the site that students can use for project ideas. I will also demonstrate how to search and remix a project within Scratch.
2. Following the demonstration, students will assemble within their respective groups and retrieve their group's Makey Makey prototype from the classroom cabinet where they were stored from the previous class session.
3. I will go over some basic instructions and requirements for the Scratch project. I don't want to be too restrictive here because I want students to explore and be creative while they learn. I want to keep the project very basic due to time constraints therefore students will be creating a remix.
4. Each group will be encouraged to visit the Scratch website and access the Explore area within the site for ideas if needed. I am expecting some groups to begin remixing their project immediately and others to review the projects in the Explore area before starting creating their remix. This will largely depend on the group dynamics, confidence, and experience levels.
5. Students are encouraged to play, explore, create, and test their remixed project.
6. I will be circulating throughout the classroom as groups work with their Makey Makey prototype and Scratch to observe the exploration, communication, interaction, collaboration, and creativity taking place within the groups.
7. After the Scratch session has ended, the group project will be saved and shared with the Scratch community. I will instruct the students to choose one group member to serve as the point of contact and owner of the project for the group. This can be the same contact person that was chosen as the Google contact or it can be another group member. The point person should create a Scratch account and the information should be shared with the group.
8. After the Scratch project has been saved and shared, the group will discuss their experience(s) using Scratch, how Scratch interacted with Makey Makey, what they learned, and any

successes and/or failures. The Google point person will document the discussion and update the shared Google Doc accordingly.

9. Each group will disassemble their Makey Makey kit and the everyday objects will be returned to their respective owner.
10. I will initiate a wrap up class discussion involving all the groups and encourage students to share their experiences with the class regarding any part of the lesson that they wish to discuss.
11. A self-assessment will be completed following the conclusion of the entire lesson.

How-to Instructions and Additional Resources: Class Session 1

Describe activity that will reinforce the lesson

1. Assemble into your selected groups, open the Makey Makey kit box, and examine the contents.



2. Your kit should contain a maker board, USB cable, 7 controller clips, and additional wires.
3. Please visit <http://makeymakey.com/howto.php> for set up instructions. Additionally, instructions are also included within your Makey Makey kit box.
 - a. If a popup window displays asking you to install drivers or perform some additional set up, please click Cancel or close the window.
4. Please walk through steps 1-4 on the website to set up your board. Connect the USB from the Makey Makey to a computer and connect the controller clips from the board to different objects.



5. Once the set up is completed, test your Makey Makey (Step 5 on the website) to ensure it's working properly by connecting to "Space". Then, by playing some drum sounds using the arrow and space on the Makey Makey.
 - a. Don't forget to ground yourself by holding the metal part of the clip that is connected to "Earth" on your Makey Makey.
6. After your group has the Makey Makey set up and functioning correctly, it's now time to play!

- a. **NOTE:** If a member of the group has access to a cell phone, please take photos of the group's progress as the Makey Makey prototype is being built and played with. This is not a requirement, but recommended if the group has access to a cell phone with a camera.
7. Each group member was asked to bring 1-2 small everyday objects from home prior to this class session that will be tested as controllers on the Makey Makey. You can also look around the classroom to see if you can find any additional objects that your group would like to test.
8. Start connecting stuff and have fun exploring! You can use the Drum sounds program on the website as a testing tool or the project that I created to ensure that your everyday object controllers are functioning correctly. Make any object into a key. If an object isn't conductive, you can combine conductive and nonconductive objects to make a connection.
9. Examine the list of **conductive** materials from the Makey Makey website that you may wish to try: (<http://makeymakey.com/howto.php>).
10. Play, invent, create, and most of all have fun!
11. Once playtime is over, as a group discuss and document the following:
 - a. The group's experience(s) using the Makey Makey.
 - b. What was learned?
 - c. What were the successes?
 - d. What were the failures?
 - e. What types of objects were used as controllers?
12. Select a point person to create a Google Doc, document the discussion, and then share the document with each group member as well as myself.
13. Store your Makey Makey prototype within the cabinet of the classroom for use in the next class session.

NOTE: If you would like to bring any additional objects to the next class session to try with the Makey Makey please feel free to do. During the next class session, you will work with Scratch and use the Makey Makey to interface with your Scratch project

How-to Instructions and Additional Resources: Class Session 2

Describe activity that will reinforce the lesson

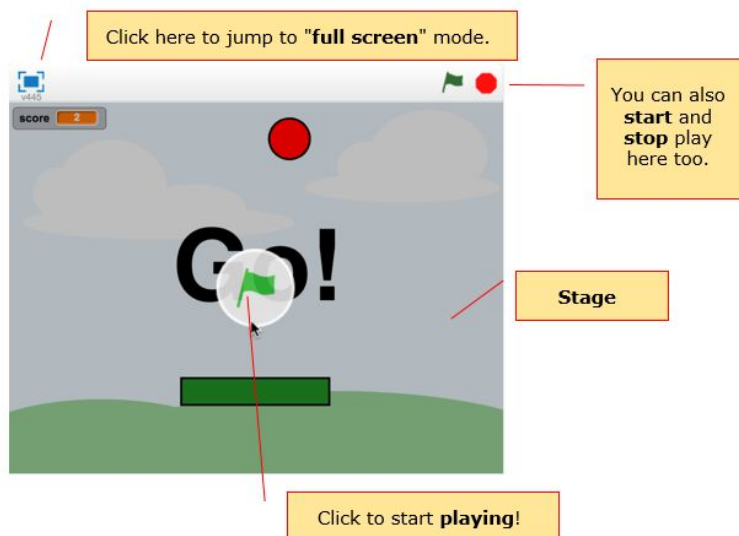
1. Assemble into your selected groups, and retrieve your Makey Makey prototype from the storage cabinet within the classroom.
2. Set up and connect your **Makey Makey** prototype to your group's computer.
 - a. You can review <http://makeymakey.com/howto.php> if you need a refresher.
 - b. Be sure that all the controllers are connected to their respective objects and the board is plugged into the computer via USB.
3. Visit <https://scratch.mit.edu> and select a member from the group to create a free Scratch account.
 - a. Click **Join Scratch** in the upper right hand corner of the website to set up the free account.



4. Use the **Search** option within the Scratch website to search for existing "Makey Makey projects".



5. Browse through the results and locate a project that looks of interest to the group.
6. Click on the existing project link to access the project.
7. A **small green flag** will display on the program's "stage", click on the green flag to begin playing with the program using your Makey Makey prototype.
 - a. **EXAMPLE:** I located a project titled "Makey-Makey "Pong"!" by a user named ssimpkin at <https://scratch.mit.edu/users/ssimpkin> as my starting and testing point. See below.

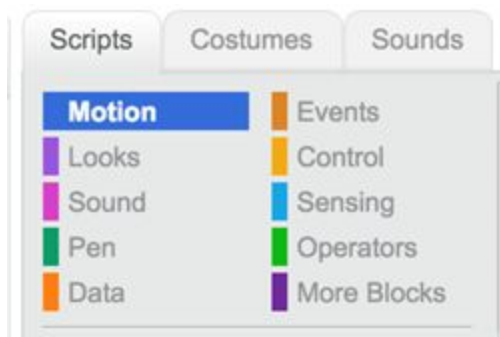


8. Once you have played for a few minutes and tested your Makey Makey prototype with the project, click on the "**See inside**" button in the upper right hand corner (please use the computer keyboard to do this).
 - a. This will show you the programming steps and components used to create the project.



9. Take a few moments to familiarize yourself with the different areas inside the project.
 - a. Explore the **Scripts, Costumes, Sounds, Sprites, and Stage** areas by click on each component.





- b. For help with Scratch, you can visit <https://scratch.mit.edu/help> to watch Scratch videos and explore Scratch Guides.
10. Once the group is feeling comfortable with navigating through the Scratch interface, using your computer keyboard click the **Remix** button located in the upper right corner of the web page.



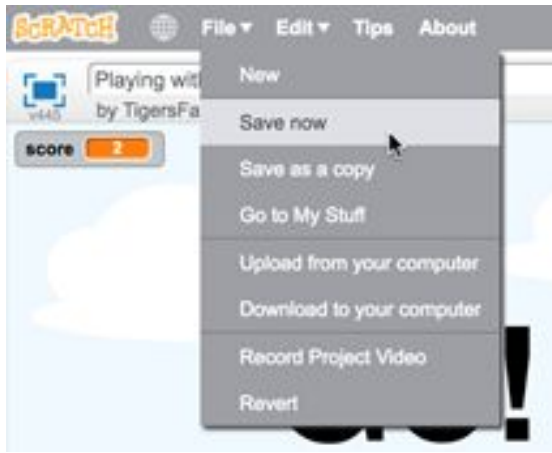
11. **Remixing** a project will allow you to save a copy of the existing project as a starting point then add your own ideas.
- a. A copy of the project will be saved to Scratch account that was created at the start of this lesson.
 - b. If you did not create a Scratch account at the start of lesson, please do so now. You will be prompted to either Sign in or Join Scratch.
12. Once Remixed, a copy of the project will be saved to the group's account.
13. Please access your "stuff" by clicking on the small folder icon in the upper right corner.



14. Within the "My Stuff" folder, locate the remixed project and click the "See inside" button.
15. Notice that the group is now listed as the **project owner**.



16. **Rename** the project.
17. As a group, collectively decide how to modify the project in some meaningful way. You can change the stage, colors, add sounds, add new functionality, etc.
18. Once the project has been modified, **Save** the project. This will save the project to the "My Stuff" folder.



19. Test the project using the Makey Makey prototype as a computer interface. The project should interact successfully with the Makey Makey prototype. If not, check the clips and objects to ensure they are all connected correctly.
20. **Play!**
21. Once the group has played for a few minutes (be sure everyone gets a chance to play), Save the project once again to be sure everything has successfully been saved.
22. Click on the "**See project page**" button in the upper right corner of the page.



23. Please fill out the **Instructions**, **Note and Credits**, and "**Add project tags**" sections. You always have to give credit where credit is due! Give the original creator a shout out!
 - a. For project tags, include keywords that could be used to locate the project when conducting a search. For example, pong, Makey-Makey pong, pong game, etc. would be a few keywords that would be useful to include.
24. Click the **Share** button in the upper right corner to share the completed project. Until the project is shared, it remains in Draft mode.



25. As a group, discuss and document the following:
 - a. The group's experience(s) using Scratch.
 - b. The group's experience(s) using the Makey Makey prototype as a computer interface with Scratch.
 - c. What was learned?
 - d. What were the successes?
 - e. What were the failures?
26. Update the group's Google Doc to include the above discussion.
27. Disassemble the Makey Makey prototype and place the contents back into the box, return the everyday objects to their respective owners, log out of Scratch, log out of Google, and return to your seats for a brief wrap up class discussion about your experiences with both Makey Makey and Scratch.

Assessment:

Individual learning will be assessed by completing a **self-assessment**.

Group learning will be assessed based on the following criteria:

1. The group actively worked together and created a positive learning environment that promoted exploration, creativity, and collaboration through personalized learning.
 - a. Visiting each group and making observations will assess this outcome.
2. The group demonstrated an understanding of creating and using Makey Makey as a computer interface through the use of technology.
 - a. Visiting each group and making observations will assess this outcome.
3. The group produced a functional Makey Makey prototype.
 - a. Visiting each group and making observations will assess this outcome.
4. The group successfully remixed a Scratch project and updated the project's details within Scratch.
 - a. Visiting each group and making observations will assess this outcome.
 - b. I will access the group's project details in Scratch.
5. The group's Scratch project was shared with the Scratch community.
 - a. I will access the group's project details in Scratch.
6. The group's Makey Makey prototype successfully interacts with the team's remixed Scratch project.
 - a. Visiting each group and making observations will assess this outcome.
7. The group's discussion was successfully documented and shared as a Google Doc.
 - a. I will access the group's shared Google Doc and read through the discussions.

Additional learning assessments will be made based on the wrap up discussion at the conclusion of the entire lesson.

Resources:

ChannelSuperFun. (2015, February 2). *Makey Makey – How would YOU interact with your computer?* [Video file]. Retrieved from <https://www.youtube.com/watch?v=5gYHeol2lhw&nohtml5=False>

Culatta, Richard. (2013, January). *Reimagining Learning* [Video file]. Retrieved from <https://www.youtube.com/watch?v=Z0uAuonMXrg>.

Google Help. (2013, October 14). *Google Drive: Sharing your documents and files* [Video file]. Retrieved from <https://www.youtube.com/watch?v=NcaPTAVqp0k&nohtml5=False>

LinusTechTips. (2015, February 10). *Makey Makey – Practical and Fun Computer Control* [Video file]. Retrieved from <https://www.youtube.com/watch?v=Cks7jspJQGs&feature=youtu.be>

MaKey MaKey Quick Start Guide. (n.d.) Retrieved from <http://makeymakey.com/howto.php>

Samah, N. A., Yahaya, N., & Ali, M. B. (2011). *Individual differences in online personalized learning environment. Educational Research and Reviews*, 6(7), 516-521. Retrieved from <http://ezproxy.msu.edu.proxy2.cl.msu.edu/login?url=http://search.proquest.com.proxy2.cl.msu.edu/docview/1657313561?accountid=12598>

Scratch. (n.d.) Retrieved from <https://scratch.mit.edu>

Scratch Ed. (2011, November 13). *Intro to Scratch* [Video file]. Retrieved from <https://www.youtube.com/watch?v=ywG6lv9mFLI>

ScratchEd. (2013, May 6). *Scratch Overview* [Video file]. Retrieved from <https://vimeo.com/65583694>

Scratch Help. (n.d.). Retrieved from <https://scratch.mit.edu/help/>

Silver, J. (2012, May 13). *MaKey MaKey – An Invention Kit for Everyone* [Video file]. Retrieved from <https://www.youtube.com/watch?v=rfQqh7iCcOU>

Silver, J. (2013, April). *Hack a banana, make a keyboard!* [Video file]. Retrieved from https://www.ted.com/talks/jay_silver_hack_a_banana_make_a_keyboard?language=en-t-19940

ssimpkin. (2013, April 8). *Makey-Makey "Pong"!*. Retrieved from <https://scratch.mit.edu/projects/10105317/>

Web Literacy. (n.d.). Retrieved from <https://teach.mozilla.org/web-literacy>